Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Machine learning for quantum technology and quantum computing

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Many quantum protocol discovery problems can be formulated as closed- or open-loop control tasks, such as those for quantum error correction (QEC) and quantum gate design. Highlighting a QEC protocol as an example, I will explain how the problem of feedback control naturally adapts to the workflow of reinforcement learning (RL) – a discipline of machine learning typically used in technological applications like self-driving cars. Through some of the earliest works on RL applications in quantum physics, we have found that such techniques can be useful for designing protocols for steering quantum systems toward desired goals, especially when used as an add-on to theoretical formulations. After briefly highlighting those early works and the current state of the art in this emerging field, I will present my latest works, where theoretical protocols for fast and high-fidelity quantum gate construction were shown to be improved through RL-discovered, non-intuitive controls, demonstrating its importance in quantum computing.

Tuesday, Jul 8th 2025

16:00 Hrs (Tea / Coffee 15:45 Hrs)

Auditorium, TIFRH